In operation, the frequency of withdrawal of the increments of fluid from the moving stream is predetermined, of course, not only by the physical size of the device but in particular by the ratios of the installed gears. The movement of the fluid supplies the activating force for rotation of the paddlewheels **31**, **32**, and consequently the rotary motion of the worm conveyor **20**. As the worm conveyor **20** revolves, it brings the inlet port **23** of the disc **22** in line with the inlet port **13** in the forward end wall **12**, thereby opening the first chamber. Fluid is withdrawn from the stream, the quantity thereof being determined by the velocity of flow of the sampled stream. Fluid is withdrawn and discharged via the outlet port **27** under the positive action of the worm conveyor **20**. The withdrawal of fluid from the stream continues until the chamber is closed by the inlet ports **13**, **23** moving out of alignment. The withdrawal of fluid is continued as the inlet ports **13**, **23** again come into alignment and so on ad infinitum as long as sampling continues.

A feature of the device is that the amount of fluid withdrawn is directly proportional to the rate of flow of the sampled stream. Fluid pressure and temperature, or variations thereof, have no significant effect on sampling and hence even the velocity of fluid flow can be determined by use of this device calibrated in advance, to accurately measure the total quantity of sample taken during a timed period.

EXAMPLE

By way of illustration, tests have been conducted wherein samples have been taken of fluid flowing through a conduit, in which the described device was installed. Pursuant to these tests it has been found that a constant sample quantity has been obtained of 0.075 ounce of fluid at sample frequencies of 5, 10, 20, 50, 100 and 150 withdrawals of fluid per minute, by weight. Pressures in the pipe varied from 150 p.s.i.g. to 300 p.s.i.g. at each frequency with no change in sample quantity. Controlled velocities of 1, 3 and 5 feet per second were used.

Another unit was operated at 50 samples per minute for a period of 1000 hours with fluid at 150 p.s.i.g. pressure, with no measurable variation of sample quantity.

The apparatus of the present invention can be constructed of essentially any material substantially inert to chemical or corrosive action by the fluid, or contaminating elements. The entire apparatus can be conveniently constructed of various metals, e.g., ferrous metals such as iron, iron alloys, steel, stainless steel, and the like; or, e.g., brass, copper, bronze, chrome, and the like. The materials can be of solid or laminar construction, and can be provided with a protective film, coated, plated, or the like; particularly, those films known to be unreactive or impervious to known chemicals contained in the sample fluid. Rigid and semi-rigid forms of plastics, and plastic-like materials can also be employed, these materials being particularly desirable especially in the construction of the helical portion of the worm conveyer and associated sealing components. The self-lubricated plastics are especially preferred in this capacity, and are also especially suitable for application in the form of protective films. The polyfluorinated ethylene polymers, notable among which is polytetrafluoroethylene (Teflon), are particularly outstanding.

It is apparent that various changes, such as in absolute or relative dimension of the parts, materials used and the like, as well as the suggested mode of taking samples, can be made without departing the spirit and scope of the invention, as will now be apparent to those skilled in the art.

Having described the invention, what is claimed is:

1. In apparatus for sampling the fluid of a flowing stream wherein fluid responsive means are actuated to intermittently open and close an inlet for withdrawal of increments of fluid from the stream the combination comprising

a dual compartmented cylindrical chamber defined by the side wall of a tubular member, with enclosing end walls, and an intermediate wall provided with a central opening,

a fluid outlet port located within the first compartment,

a fluid inlet port located within the end wall of the first compartment,

a disc, also provided with a fluid inlet port, located within the first compartment with a flat side adjacent the end wall of the said compartment,

a worm conveyer comprising a shaft lying along the central axis of the said first compartment, said shaft being rigidly affixed at one end to the center of said disc and the other extending through the central opening of the said intermediate wall, a helical blade surrounding said shaft of external diameter substantially equal to the internal diameter of the said first compartment,

gear means located at the end of said shaft extending through the central opening of the intermediate wall, and into the second compartment,

a drive shaft extending through the side wall of the tubular member and into the second compartment,

a gear drive interconnected with said drive shaft, said gear drive being operatively associated with the gear means of the worm conveyer shaft, and

fluid actuated means located outside the chambers, operatively associated with the said gear drive,

whereby contact of the fluid actuated means by the flowing stream causes rotation of the drive shaft and gear drive and consequently the worm conveyer shaft, this in turn actuating the worm conveyer causing rotation of the helical blade and disc, intermittent alignment of the fluid inlet ports of the rotating disc and end wall of the first compartment, so that increments of fluid proportional to the rate of flow of the moving stream are positively selectively withdrawn from the stream via the positive action of the helical blade and passed through the fluid outlet port of the first compartment to provide a composite fluid specimen representative of the total stream during a sampling period.

2. The apparatus of claim **1** wherein the disc is of diameter equal to the internal diameter of the first chamber, the disc being rotatably held in place by the end of the shaft.

3. The apparatus of claim **2** wherein the disc is constructed at least in part of polyfluorinated ethylene polymer.

4. The apparatus of claim **1** wherein the fluid actuated means located outside the chambers comprises a pair of paddlewheels, located on the drive shaft, one on each side of the said second chamber.

5. The apparatus of claim **1** wherein the fluid outlet port is provided with a sample take-off line extending through a fluid-impervious partitioning device to a remote area.

6. The apparatus of claim **5** wherein the fluid-impervious partitioning device comprises a recessed flanged plate for operative connection with a nozzle wall of a pipe conduit, the center of said plate being provided with a stuffing box, packing and tightening bolt through which the sample take-off line is extended.

7. The apparatus of claim **1** wherein a variable gearing arrangement for predetermination of the sample take-off frequency is provided, this including the combination comprising

the worm conveyer shaft which is journalled within the central opening of the intermediate wall and to the end wall of the second compartment, and gear means located on said worm conveyer shaft,

the drive shaft which extends through the side wall of the tubular member and into the second compartment, and a gear drive interconnected with said drive shaft,